CS 3500

Written Homework 4

Due Monday 10/5

Read Tanenbaum, Bos: Chapter 2.3, 8.1.3

Exercises

1. Recall that the user character `O` runs from a chasing character `*` in the program `chase.C` (from the `Public/os/demo_thread` directory). Explain what you would need to do the program so that it had two chasers. You don't need to code it - just describe what to do.

2. Suppose that `day`, `month`, and `year` are shared global variables, and `daysInMonth` is an array storing the number of days in each month. Here is code to change to the next day:

   ```
   void next_day() {
       day++;
       if (day > daysInMonth[month]) {
           day = 1;
           month++;
           if (month > 12) {
               month = 1;
               year++;
           }
       }
   }
   ```

   Suppose the variables are `day=31`, `month=12`, `year=2015`, and two threads run `next_day()` simultaneously. What are the possible results of this computation?

3. Explain why spinlocks are never appropriate for uniprocessor systems.

4. Using an atomic `TSL` instruction, entry to a spinlock can be achieved with `while(TSL(lock));` Some processors provide an atomic `SWP(lock)` instruction, which swaps the contents of a register with the memory location `lock`. Show how to use atomic `SWP` instead of `TSL` for a spinlock.